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# CORN CULTURE IN THE SOUTH.

BY

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# LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
*Washington, D. C., June 1, 1898.*

SIR: I have the honor to transmit herewith an article on corn culture in the South, by Prof. S. M. Tracy, M. S., formerly director of the Mississippi Agricultural Experiment Station. The purpose of the article is to encourage the more extensive growing of corn in those portions of the South where its culture has hitherto been more or less neglected. Professor Tracy's long experience in experiment station work and his wide acquaintance with agricultural conditions in the Southern States have made it possible for him to prepare an article in which the combined results of investigations and experience on this subject are concisely stated.

I recommend the publication of this article as a Farmers' Bulletin.

A. C. TRUE,
*Director.*

Hon. JAMES WILSON,
*Secretary of Agriculture.*

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# CORN CULTURE IN THE SOUTH.

## INTRODUCTION.

During the last ten years the rapid growth of the live-stock industry, the continually decreasing price of cotton, and the more general appreciation of the advantages of diversifying crops have led to a marked increase in the acreage of corn and a corresponding increase in the importance of this crop in all of the Southern States. This increase has not been sudden or irregular, but has come naturally with the gradual and constant change in conditions, and all indications point to a still greater increase in the near future.

It is true that the average yield per acre of corn in the South is not equal to that secured in the corn States of the Northwest, but that this is owing more to methods of culture than to differences in soil or climate is evidenced by the fact that the largest yield of corn on record—237 bushels per acre—was grown in South Carolina, and that the census of 1880 showed that the second heaviest yield per acre for any whole county in the United States was made in Issaquena County, Miss. So long as cotton commanded high prices the planter was satisfied to exchange it for corn. The best land and the best labor was given to cotton, and the corn, if any was grown, was given second choice in the division of the fields and only such labor and attention as could be conveniently spared from the cotton. No more corn was grown than was used on the plantation, and the supply was usually exhausted long before the new crop was ready for use, and often before it was planted. Under such conditions the corn crop was of only secondary importance, and was not relied upon as a market or a money crop.

With a continually increasing demand, however, more attention is now being given to corn, and wherever it has received the same care and attention which have been given to cotton the results have been fully as profitable and satisfactory.

The South has special advantages for the raising of corn, in the long season during which it may be grown and in the ready sale for the crop at remunerative prices. Planting may be done as early as February in the Gulf States, or it may be deferred until after a crop of oats or clover has been gathered from the land in June. Killing frosts rarely occur before November, so that even the latest plantings have ample time to mature, while the early plantings may be harvested in

time for growing hay or for sowing winter oats or some other crop on the same ground. Notwithstanding the great increase the local demand is not yet fully supplied and in most localities the entire crop finds a ready sale in the home market and at prices which Western corn growers would regard as very high. In a few localities it has been sold occasionally as low as 25 cents per bushel, but that price has been rare and local, 50 cents per bushel being nearer the average through the Gulf States, the price being somewhat less than that in the northern section and higher farther south.

With a soil and climate well suited to its growth and with an increasing home demand for the crop the cultivation of corn is certain to become one of the leading farm industries of the South in the near future. Methods of culture and of handling the crop necessarily differ in many ways from those followed in other parts of the country, and it is the aim of this bulletin to describe briefly those practices which have been found most profitable and economical in the region south of the Ohio River.

## THE SOIL AND ITS PREPARATION.

Any soil which will produce a good crop of cotton will also produce good corn, although dry, upland clay soils, which will make a fair yield of cotton when well fertilized, are not so well suited to corn as those which are richer in decayed vegetable matter (humus) and so suffer less from drought. Heavy crops of corn can often be grown on soils which produce a too-rank growth of cotton stalks without a corresponding amount of fruit. The best soil for corn is a rich, sandy loam which is well drained and which contains a fair amount of humus. As corn makes a rapid and succulent growth it should be grown on a soil which holds moisture well, and as the weight of the ears bears a close proportion to the size of the stalks the soil can not well be too rich. Humus is of more importance in the retention of moisture than any other one ingredient of the soil, and a loamy soil which is rich in this material seldom suffers from drought.

One of the best soils for corn is one on which red clover has been grown. Both crops flourish on the same kinds of soil, and the decaying stems and roots of the clover furnish a good part of both the humus and the food needed by the corn. When old clover fields are not available, land on which melilotus (sweet clover) has been grown is nearly or quite as good. In fact, any land which has made good crops of hay will make a good crop of corn immediately after the sod has been plowed. It is not always possible to secure fresh sod land on which to grow corn, and in such cases the preceding crop should, if possible, be cowpeas or vetches, both of which make a rank growth and furnish large amounts of humus which is rich in nitrogen collected from the air. The decaying organic matter also exerts an important solvent effect on the mineral elements in the soil.

Owing to the heavy winter rainfall in the Southern States plowing should be done only a short time before planting. Fall plowing for corn is seldom a good practice, excepting on new ground where a tough sod must be rotted before the soil can be made mellow. It is not a good practice to leave the bare soil exposed to the washing and leaching of the winter rains. For this reason, when tough sod land is to be planted in corn it is usually better to plow in the preceding spring or early summer and sow in peas, as the peas will rot and mellow the sod better than any other crop which can be grown, and corn seldom fails to make a heavy yield on land treated in that manner. The plowing should be deep and thorough, but whether subsoiling is profitable is still an open question. Many who have tried subsoiling have found it followed by such a marked decrease in the crop that they have abandoned the practice after the first season, while a few others have found it to produce a very satisfactory increase in the crop and regard it as a necessary part of the most economical method of preparing the soil for planting. The black prairie and river bottom soils are usually improved by both deep plowing and subsoiling, while heavy clays and light sandy lands give better yields when the plowing is not too deep.

Whether the plowing should be done flat or in beds depends on the lay of the fields. Lands which are sufficiently rolling to allow the surface water to run off quickly should be plowed flat, while creek and river bottom lands on which water is liable to stand after heavy rains will do better when plowed in beds. Formerly nearly all corn lands were plowed in 4-foot beds made by throwing four furrows together as is done for cotton, and the planting was done on the top of the bed. This practice is now being abandoned on all lands excepting those liable to overflow, and even there the beds are now often made 8 feet in width, giving room for two rows on each bed, which is much the better plan. Bedding requires more labor than plowing flat, has no advantages, and has many disadvantages on well-drained lands, and should never be practiced where it can be avoided.

The harrowing should be as thorough as the plowing, and there is no danger that it will be overdone. The harrow should follow the plow very closely in order to pulverize the soil before it becomes dried in hard clods, and if the land is not planted immediately the harrow should be used again just before planting to kill the germinating weed seeds. The labor expended in a thorough preparation of the soil shows its effects through the whole season in the better stand which will be secured, in the less amount of labor needed in cultivation, and in the increased yield.

## ROTATIONS.

A crop of cotton occupies the land during the entire year and is a poor preparatory crop for corn, but where it is made the principal crop, as it will always be on many plantations, corn must sometimes follow

it, and the best rotation must depend on the proportionate areas which are given to each of the two crops. Where two-thirds or more of the land is used for cotton, with no permanent hay fields, as is very common in the Yazoo Delta and many other rich alluvial regions, a common rotation is: First year, cotton; second year, corn and cowpeas and winter oats and vetch; third year, cotton.

This rotation is almost the only one possible where nearly all of the plantation is used for cotton. The corn should be planted as early as possible and at the last cultivation cowpeas should be sown between the rows. The crop can be harvested by September, when the ground should be sown at once with a mixture of turf oats and hairy vetch. The oats and vetch will grow through the winter, furnishing excellent winter grazing, or they may be cut for hay in April in time for planting cotton again. Where so little corn is grown it is almost always possible to find a place for it where some crop other than cotton was grown the previous year, and where such an arrangement of fields can be made it is always better than to put corn on land which has been in a hoed crop the preceding season.

Where only one-half the land is used for cotton, different rotations are more easily arranged. One four-year rotation which gives very good satisfaction is: First year, cotton; second year, cotton; third year, cowpeas and oats and vetch; fourth year, corn and cowpeas. In this rotation the corn is preceded by two leguminous crops, while the cowpeas grown with the corn leave the land in excellent condition for the following cotton crops.

Where red clover can be grown a better rotation is one which occupies the ground for four years, but can be extended to a longer time by repeating the cotton crop, as follows: First year, cotton; second year, cowpeas and clover; third year, clover; fourth year, clover and corn; fifth year, cotton. In this rotation the cowpeas are sown early in the spring of the second year and made into hay in September, in time for the sowing of clover. The clover occupies the ground all of the third year, and will give one heavy cutting in May of the fourth year in time to plow the land for corn. This is one of the best rotations for general use, as the cowpeas of the second year put the soil in fine condition for clover, and the clover is the best possible preparatory crop for corn. The land is occupied by corn and forage crops three years, and after such a preparation will make several successive cotton crops by the use of only small amounts of chemical fertilizers. In that way the rotation can be made to cover as many years as may be desired, and the land is never idle. Oats may be grown in the place of cowpeas, but as the crop is not one which is desirable for preceding clover it should be substituted only on a rich soil which is in a good mechanical condition.

W. C. Stubbs, of the Louisiana Experiment Station, recommends the following rotation for that State: Corn and cowpeas, oats and cowpeas,

cotton. E. R. Lloyd, of the Mississippi Station, in speaking of the upland lime soil of that State, says: "If one-half the land is to be in cotton and the other half in corn, I would fertilize the cotton the first year with 250 pounds each of cotton-seed meal and kainit and would plant cowpeas in the corn at the last cultivation. The second year I would plant the corn land in cotton and fertilize with 100 pounds of cotton-seed meal and 200 of kainit, planting corn and cowpeas on the cotton land of the previous year. The third year I would plant cotton on the corn land and fertilize with 200 pounds of kainit. I would continue that alternation, using less commercial fertilizer and no meal after the second year, as the cowpeas, if plowed under, will be sufficient to maintain the fertility of the soil." J. F. Duggar, of the Alabama College Station, recommends the following: "First year, corn, with cowpeas between the rows if the land produces less than 20 bushels of corn per acre, followed by winter oats; second year, winter oats followed by cowpeas; third year, cotton. A more practical system, as giving a larger area in cotton, is a four-year rotation, begun as above, and completed with cotton in the fourth year." R. J. Redding,[1] of the Georgia Station, recommends the following for a three-year rotation:

| Years. | Division 1. | Division 2. | Division 3. | Division 4. |
|---|---|---|---|---|
| First year... | Small grain and cow-peas. | Cotton..... | Corn and cowpeas .. | Orchards, truck, forage, etc. |
| Second year.. | Cotton..... | Corn and cowpeas .. | Small grain and cow-peas. | Do. |
| Third year... | Corn and cowpeas .. | Small grain and cow-peas. | Cotton..... | Do. |

"In the above plan the farm, for convenience, is supposed to be divided into four approximately equal divisions. * * * On many farms the divisions might be extended to five, the fifth to include a more or less permanent pasture."

J. S. Newman, of the South Carolina Station, recommends corn and cowpeas, followed by small grain sown in the fall for the first year. The second year the small grain is followed by cowpeas, and the rotation is completed by cotton the third year.

Every planter will use a rotation to suit his own land and circumstances, and those given above may be modified to meet almost any requirements. Whatever rotation may be adopted, some leguminous crop, clover, melilotus, vetch, or cowpeas, should be grown immediately preceding the corn if possible.

## FERTILIZERS.

As already suggested, red clover, cowpeas, and other leguminous plants are the best fertilizers which can be used for corn. On land which has produced a good crop of any of these plants very little

[1] Georgia Sta. Bul. 37.

additional fertilizer of any kind is needed to insure a good yield of corn the following season. The abundant supply of nitrogen furnished by these plants affords a large part of that needed by the corn, and in addition to this the forage crop makes available a large amount of other plant food in the soil which could not be reached directly by the corn roots. The humus left in the soil is as valuable in its effects as is the increased supply of food. The provision of an ample supply of humus is an essential item in economical fertilizing, and one which is too often overlooked. Humus is the great regulator of the supply of moisture, and it also has a powerful solvent effect on the potash and phosphoric acid in the soil. This solvent action is especially effective on the phosphoric acid, soils rich in humus having several times the amount of soluble phosphoric acid which is found in soils poor in humus.[1] Although humus from other sources appears to have the same moisture-regulating and solvent effects, still the use of leguminous plants for its production is more economical, as such plants draw a large amount of nitrogen from the air and leave it in the soil, and thus provide the most expensive element of fertility without cost.

When for any reason the land can not be made fertile by the growing of legumes, barnyard manure is next in value as furnishing the necessary humus and nitrogen, though it should ordinarily be supplemented with potash and phosphoric acid. Barnyard manure varies so widely in composition that no exact value can be assigned to it, nor can any definite rule be made as to the amounts which should be used on different soils. Ordinarily its greatest value is in its humus-making capacity, and this is especially true in the South, where it is seldom kept under cover and where the soluble potash and phosphoric acid are largely leached out and the nitrogen lost in the air before the manure is spread on the land. This loss of fertilizing elements can be largely avoided by hauling the manure to the field as fast as it is made, but that is not always practicable. If barnyard manure alone is used as a fertilizer there is little danger that the application will be too heavy. Ordinarily it is better to apply it broadcast before plowing, and it is better to give a part of the field a heavy dressing once every few years than to make a very light application over the whole every year. If the manure is fresh and coarse, full of cornstalks, straw, and other rubbish, it should be used on clay rather than on sandy soils, while if fine and well rotted it will be more effective on the lighter soils. Less than 20 wagonloads per acre will not often produce marked results, and if 50 loads per acre are available they can be used with profit. The manure will be much more effective if from 100 to 200 pounds per acre of acid phosphate is mixed with it when it is hauled to the field, and, at planting, the same weight of kainit or one-fourth as much muriate of potash should be used under the seed.

When neither green manuring nor barnyard manure is available, cotton seed, cotton-seed meal, potash salts, and phosphates must be

[1] Minnesota Sta. Buls. 30 and 41.

used, the quantities and proportions varying with the character of the soil. The necessary supply of nitrogen can be secured most economically from either cotton seed or cotton-seed meal, the former being better for heavy, clay soils, while the latter is more effective on light, sandy lands. Nominally 1 pound of the meal has a fertilizing value equal to that of 2½ pounds of seed, but their relative effects may vary widely from those proportions. The seed furnishes a much larger amount of humus than does meal containing an equal amount of plant food, and so is more effective on soils which have not recently been fertilized with vegetable matter. The whole seed makes a heavy soil lighter, looser, and more easily worked, while meal has the contrary effect. The whole seed is more lasting in its effects than is meal, a considerable part of it not being exhausted before the end of the second season.

The common practice of wetting the seed and allowing it to heat sufficiently to kill the germ before using it is wholly unnecessary when it is used as a fertilizer for corn, as it is used so early in the season that nearly all of it will be killed in the ground, and even if a few seeds should germinate, the young plants will be killed by the first cultivation and will decay so quickly that nothing will be lost. When the whole seed is used, from 25 to 50 bushels per acre is a fair application.

Cotton-seed meal is better than the whole seed for use on light soils. It makes such soils more compact, and thus less easily affected by drought, which is often an important item on the soils of the pine woods and Gulf region. It decays and becomes available for plant food very quickly, and nearly all of its fertilizing value will have been exhausted by the end of the growing season. From 200 to 400 pounds per acre may be used to advantage, and, like the seed, it should be supplemented by the addition of potash and phosphoric acid. When the larger amount is to be used, especially on soils which are very light, it is better to use it in two applications, the first being made in the drill just before the corn is planted, and the other at the time of the last cultivation, when peas should be planted between the rows. The best general rule is to use whole seed on heavy soils and for lasting effects, and meal on light soils and for quick results.

Corn has a comparatively long period of growth, covering that part of the year when decomposition goes on quite rapidly in the soil. For this reason it utilizes to best advantage the slow-acting nitrogenous fertilizers, such as green manures, barnyard manure, cotton seed, cotton-seed meal, etc.

Potash can be best secured either as kainit or as muriate of potash. The actual potash in each appears to be equally available and valuable, so the choice between the two will depend on their relative prices. As a ton of the muriate contains four times as much potash as a ton of kainit, the consumer can afford to pay, including freight, four times as much for it. When freight forms any large part of the expense, the

muriate is usually the cheaper form. Cotton-hull ashes are worth more than twice as much as kainit, as they contain nearly double the amount of potash in addition to nearly 9 per cent of phosphoric acid, and are the more economical fertilizer when they can be bought for double the price of kainit. The amount of potash needed varies greatly for different localities, and no definite rule for its use can be formulated. In the work of the Louisiana Station it has rarely proved necessary or profitable. The Mississippi Station found it more beneficial than phosphoric acid on upland lime soils, and equally necessary in the coast region, while in the pine woods region of the State it produced little or no effect. At the Alabama Station its effects have been uncertain, apparently producing a marked increase in the crop at some times and being wholly ineffective at others. At the Georgia Station it has also been very uncertain in its action, though more often beneficial. Results of experimental work in South Carolina and Florida have been exceedingly variable, while at the Kentucky Station potash has uniformly given good returns. In all of the Southern States it has been impossible to make reliable predictions as to the effects of potash on untried soils, though there is no doubt that less is needed on fresh land than on that which has been long in cultivation, and that it is more effective on lime soils than elsewhere.

Phosphoric acid can usually be secured in form of acid phosphate at less cost than in any other form. The field tests made at all the Southern stations indicate its need on all soils excepting perhaps those which are very rich in lime. On strong lime soils its effects are not certain, and it is not as uniformly profitable as when used on the pine woods and coast soils. When used on a soil colored red by iron a large part of the phosphoric acid soon combines with the iron and becomes insoluble and inert. For that reason it is more effective when used on a soil rich in humus, and before it is spread upon the land it is better to mix it with the manure, cotton seed, or meal than with the kainit or muriate. From 200 to 300 pounds per acre is a fair amount for use.

As has already been stated, there can be no definite and invariable rule in regard to either the composition or amounts of fertilizers which should be used for corn, as both must be regulated by the natural character of the soil on which they are to be used and by the previous treatment of the land. W. C. Stubbs, of the Louisiana Station, says: "The crying need of the hills and bottom lands of Louisiana is nitrogen, and this has its best effects when combined with phosphoric acid. Upon the bluff lands we find that the reverse is true; that the crying want is phosphoric acid, and the best results are secured when combined with small amounts of nitrogen." E. R. Lloyd, of the Mississippi Station, says: "I recommend 250 pounds each of cotton-seed meal and kainit per acre, applied in the drill. If used broadcast double those amounts should be used. I prefer a good rich compost to either." J. F. Duggar, of the Alabama College Station, recommends the use of coarse manure and cotton seed under corn, supplementing the cotton

seed with acid phosphate. The results of several years' work at the Georgia Station[1] indicate that a fertilizer for corn, on the average soils of middle Georgia, should contain phosphoric acid, potash, and nitrogen in about the following proportions:

| | Per cent. |
|---|---|
| Available phosphoric acid | 7.00 |
| Potash | 1.30 |
| Nitrogen | 3.40 |

These proportions would be furnished by the following mixture:

| | Pounds. |
|---|---|
| Acid phosphate | 1,000 |
| Muriate of potash | 55 |
| Cotton meal | 1,000 |
| Total | 2,055 |

The muriate of potash may be replaced by 200 pounds of kainit.

J. S. Newman, of the South Carolina Station, recommends cotton-seed meal and acid phosphate in equal quantities, using 400 pounds of the mixture in the drill.

Most commercial fertilizers absorb moisture from the air so quickly that it is difficult to distribute them satisfactorily by the use of any machine. Probably the best implement for the purpose is a cotton planter with an agitator which will prevent the fertilizer from clogging or becoming banked against the sides of the feed box. By the use of such an implement the amount distributed can be regulated very accurately, and the fertilizer is placed below the seed bed and is so well mixed with the soil that there is no danger that it will burn the tender rootlets of the young plants. When such an implement is not available very good work can be done by fastening a section of a horn or even a tin spout in one corner of the bottom of a stout bag which is filled with fertilizer and slung over the shoulder. The opening in the lower end of the horn must be of such size that it will not clog and that the flow of fertilizer may be easily regulated by the hand. A little practice will enable the workman to distribute the fertilizer as evenly as is necessary. It is easy to estimate the part of an acre occupied by two rows, and from that the workman will soon learn to gauge his distribution. If the fertilizer is distributed by hand the drill should first be opened by a small plow, the fertilizer then distributed, and if the planting is to be done with a planter it may follow at once, but if the corn is to be dropped and covered by hand it is better to follow the distributor with a bull-tongue plow to mix the fertilizer with a few inches of the surrounding soil.

## VARIETIES.

For all ordinary purposes the best variety of corn is the one which will produce the greatest amount of shelled grain per acre, regardless of the time of ripening or of the size of either stalks or ears. In the

[1] Georgia Sta. Bul. 37.

South the growing season is so long that it is not necessary to select quick-growing varieties. The heaviest yields are commonly secured from varieties which require from 140 to 170 days for their full maturity. If the crop is to be planted on ground from which oats, clover, or some other early crop has been harvested, or on land which has been overflowed until late in the season, some of the earlier maturing sorts should be planted; but when the corn is planted early in the spring any variety will have ample time to mature before frost, and the longer period of growth will produce the larger yield.

From the results of hundreds of tests at experiment stations in all parts of the country it appears that heavier yields can be secured from white than from colored varieties. In 1,267 comparative tests with 490 varieties the average yield of 217 white varieties has been 2.5 bushels per acre in excess of the average yield of the 273 colored varieties grown in the same tests.[1] At only one of the stations from which such tests have been reported have colored varieties given the heavier yield. Of course this does not indicate that all white varieties are more productive under all circumstances than is any yellow variety, but such uniformity in results secured in all parts of the corn-growing section of the country does indicate very plainly that of all the varieties adapted to any special locality some one or more of the best white varieties will produce more grain than will any of the colored varieties. In this connection it is interesting to note that the white varieties of wheat and oats also give larger yields than do the colored varieties of the same grains.

Whether white or colored corn is better for feeding is a matter of dispute. Many feeders claim that colored corn is "stronger," i. e., that it is more nutritious and fattening than white corn, but there appears to be no reliable foundation for the belief. Chemical analyses show no constant or material differences in the composition of different varieties. Jenkins and Winton[2] give the composition of 30 varieties of white dent and 28 of yellow dent corn as follows:

*Composition of white and yellow corn.*

| | Protein. | Fat. | Nitrogen-free extract. | Fiber. | Ash. |
|---|---|---|---|---|---|
| | *P. ct.* | *P. ct.* | *P. ct.* | *P. ct.* | *P. ct.* |
| White | 11.6 | 5.8 | 78.4 | 2.5 | 1.7 |
| Yellow | 11.5 | 5.4 | 78.9 | 2.5 | 1.8 |

No experiments to determine the relative digestibility of different colored varieties have been reported, but with so little difference in their composition it is highly improbable that color alone in any way affects their feeding values.

[1] Mississippi Sta. Bul. 33.

[2] U. S. Dept. Agr., Office of Experiment Stations Bul. 11.

There are considerable differences in the root systems of different varieties, and these differences may often be sufficient to be of importance in deciding on the relative merits of different sorts. Strong and well-spread roots are necessary to hold the stalk erect after it reaches maturity, or there will be a loss from the decay of ears on stalks which have fallen or been blown down before the crop is gathered. If the stalks are to be cut for fodder or if the crop is to be gathered as soon as it is matured, a strong root system is of less importance, but if the crop is to remain in the field any length of time after it is ripe it is very desirable that it should be on stalks which will not fall to the ground. Colored varieties often have stronger root systems than do white varieties, and so are usually preferred when the crop is not to be gathered until late in the season. Very prolific white varieties, like Blount Prolific, have weaker roots than the single-eared yellow varieties, like Evans or Leaming, though most single-eared white varieties have roots sufficiently strong to hold the stalks erect. In many yellow varieties the grain is harder than in most of the white varieties, and so is less liable to decay if it falls to the ground, and is less liable to suffer from insects. All of these points should be considered in deciding on the variety to be planted. In general the white varieties will give the heavier yield, and are the better when the crop is to be gathered as soon as matured and is protected from insects until used; while if the ripened crop is to remain in the field several weeks, some of the more hardy colored varieties will be more satisfactory.

Whatever may be the color of the grain the ears will be larger when only one is borne on a stalk than when each stalk produces two or more. The general experience of Southern cultivators has been that larger yields have been secured from varieties producing two medium-sized ears on each stalk than from those which produce only one large ear, while varieties which bear from five to eight ears per stalk invariably give small ears with short grains and a smaller weight of grain per stalk than is given by two ears of medium size and good length of grain.

The cob should be small in proportion to the size of the ear. While it is true that "a large cob will hold more than a small one," it is not true that 70 pounds of ears with large cobs will have as much grain as an equal weight of ears having smaller cobs. When the cob is small, as in the Mosby, 70 pounds, or a bushel of ears, will give from 62 to 63 pounds of grain, while if the cob is large, as in the Parrish and Conscience, the same weight of ears will give only from 53 to 55 pounds of grain, a difference of nearly 20 per cent in favor of the smaller cob. If an acre will produce only a certain number of ears, the larger the ears the larger will be the yield of grain, but it is found by experience that with a variety producing ears of medium size an increase in the size of the ears is accompanied by a decrease in their number, and that the greatest amount of grain is secured from varieties which produce from

175 to 200 ears on each 100 stalks. It is better to maintain that number of ears and to increase their size if possible than to increase the size at the expense of numbers. Large cobs are usually soft and are often actually open at the butt, giving free entrance to rain, so that injury from becoming water-soaked and molded is much more common than with smaller cobs.

The position which the ear assumes in ripening is a matter of considerable importance in the selection of a variety. If the ripened ear remains erect, rain will find its way between the loosened husks at the top and will often be held by the closer husks at the butt. Under such circumstances a few warm days will cause the grain at the butt to sprout or rot. If the ear bends over in ripening so that the top hangs downward, there can be little injury from even long-continued rains.

Throughout the South the dent varieties give larger results than the flint varieties, while the so-called "starch corns," like the Hickory King, have been too soft and too subject to insect injuries to be satisfactory.

Named varieties of corn are so numerous, so local, and so changeable that it is useless to attempt to describe all or even to name any which are superior to others. The best variety for any locality is the one to which the most intelligent care has been given in the selection of seed during the last few generations. Seed from almost any variety which has been selected with care, as described on page 22, during four or five years will give better results than seed which has been taken at random from a crib of any variety. When grown for ordinary purposes the variety should have the following characteristics:

(1) It should be a dent rather than a flint variety.

(2) It should have a growing period of from 150 to 170 days.

(3) The stalks should have well-developed roots and should average nearly two ears each.

(4) The ears should be of good size, of uniform diameter throughout, well filled at both ends, and should point downward when ripe.

(5) The cobs should be small in proportion to the size of the ear.

(6) The individual grains should be long and so broad at the upper end as to leave only a slight depression between the rows.

(7) The variety should be of local origin.

## PLANTING.

Whether corn should be planted flat or on raised beds will depend on whether the land has good natural drainage or is liable to suffer from overflows. With good drainage flat planting is much the better, because preparation is less expensive and because it exposes less surface for the evaporation of soil moisture, and thus makes the crop less liable to suffer from drought. It is not unusual to see corn planted in 4-foot beds which are raised from 9 to 12 inches above the adjoining water furrow. If the top of the bed is only 9 inches above the water furrow the amount of surface between the rows is increased 4 inches, exposing

8⅓ per cent more surface for evaporation, which will often make the difference between success and failure when drought comes at a critical time in the growth of the crop. On hill lands when the corn is planted in drills each drill will form a slight ridge sufficient to prevent washing in ordinary rains, and all ridging beyond that should be avoided on such lands.

On poorly drained bottom lands, which are liable to suffer from overflows, bedding is often advantageous in hastening the drainage, and thus enabling the soil to become dry and warm enough for planting a few days earlier in the spring. Where any bedding must be done, it is better to make the beds 8 feet wide, or wide enough for two rows, with water furrows in the alternate spaces. In that way each row has a water furrow on one side, which is ample for carrying off surplus rainfall; the beds can be made higher with the same slope, though exposing less surface than the 4-foot beds, and the drainage is more thorough.

The rolling lands of the South so often suffer from washing that it is usually necessary to preserve them as much as possible by planting in drills rather than in checks. The rows should run at right angles to the slope of the hill, so as to keep them as nearly level as possible, and although this makes the rows irregular in length and in distance apart, it is the only safe plan to follow on lands which wash. In most cases "circling" the rows around a hill is fully as effective as is the ordinary form of terracing, as each row forms a miniature terrace 4 feet wide and no space is lost.

On fairly level lands, and on all lands which do not wash, the crop can be cultivated at slightly less expense when planted in checks, though it is commonly believed that the yield is slightly less. It is much easier to place the fertilizer evenly under drills than under hills, though when in drills all of the cultivation between the plants in the drill must be given with the hoe. The least expensive method of cultivating an acre of corn is to plant it in checks, and so avoid the use of the hoe; but the heavier yield can be made in drills, which distribute the plants more evenly over the ground, and planting in drills is the better plan when labor is not too expensive.

Drills are commonly placed 4 feet apart, as that gives a convenient width for cultivating; but the distances between the plants in the drills which are preferred by different planters vary greatly. Of course, the nearer the rows are placed to each other and the closer the plants in the drill, the greater the number of plants on an acre; but too many plants crowd each other, so that none can produce good ears. The richer the soil, the closer can planting be done with safety.

The amount of seed needed per acre is the same, whether the planting be done in hills or in drills, 8 quarts being the usual amount used.

The best depth for planting varies with the temperature and the moisture of the soil. The seed should be placed so deep that it will not suffer from dry weather immediately after planting, but not deep enough to be placed where the soil is cold and wet. When the seed is

dropped on the surface of the ground and covered by a hoe in favorable weather it will germinate quicker than when buried 2 or 3 inches below the surface, as is done by a planter, and is less liable to decay if the planting is followed by several days of cold and wet weather. If, however, the soil is very dry at the time of planting and dry weather continues for some time, the shallow-surface planting will fail to give as even a stand as the work done by a planter. Early plantings should not be covered more than 1 inch deep, while very late plantings should be covered with 2 or 3 inches of soil. Many believe that corn which is planted shallow will make more suckers than that which is planted deeper, but the number of suckers depends more on the variety than on depth of planting.

The use of a horse planter is less expensive than hand planting; the distribution of seed will be more even, and the planter should be used whenever the ground is in proper condition. There are a number of both one-horse and two-horse planters, all of which do satisfactory work. Whatever style is adopted the planter should be one which can be easily adjusted to distance and depth and to size of grain; it should permit the operator to see the seed as it drops from the feed box to the delivery pipe, and it should be provided with a roller to insure the covering of the seed and the compacting of the soil above the seed. A two-horse planter for either hills or drills is usually preferred for large and level fields, but for small and irregular fields and in fields where the rows are to be circled about the hills a one-horse planter is more convenient.

Whatever method of planting may be adopted, the work should not begin too early in the season. Nothing is gained by putting seed into soil which is too cold or too wet to favor germination. It is better to defer the planting a week or ten days than to run the risk of losing it by decay or of having an imperfect stand by planting before the ground is sufficiently dry to work well and warm enough for immediate growth. Every missing plant means a decrease in the yield, and replanting the missing hills is seldom profitable. The replants are surrounded by plants which mature and shed their pollen before the younger silks are formed. The pollination is therefore very imperfect, and the ears on the replants are usually nubbins, which are scarcely worth gathering. When the missing plants amount to from 10 to 20 per cent of the whole, replanting with some earlier maturing variety which will produce its tassels and silks at about the same time as the original planting is often profitable, but will not pay when the misses are less than 10 per cent. When the misses are more than 20 per cent it will pay better to make an entire new planting.

## CULTIVATION.

The nearer level and smooth the surface of the ground can be kept the better. Thorough cultivation is needed, but that does not mean deep cultivation. While corn does best on a soil which is deep and loose,

the deepening and loosening of the lower soil should be done before the corn is planted, and the shallower the later cultivations can be kept the more satisfactory will be the results. Corn has no large taproot like that of cotton, but is a surface feeder, having a large number of long roots distributed through the upper soil, and whenever the soil is cultivated so deep as to disturb any of the roots the plant is necessarily weakened by having its supply of moisture and nourishment decreased. A constant supply of food is as necessary to a growing plant as to a growing animal, and the cutting off of so many of the corn roots as is done by cultivating 4 or 5 inches deep gives the plants a check from which they never fully recover. Cultivate the ground deeply before planting and as shallow as possible afterwards.

Cultivation should begin immediately after the first rain that follows the planting. There is no better implement for this work than a light smoothing harrow with slender teeth pointing backward. One drawn by two mules can go over 10 acres in a day very easily, and there is no other way by which a thin crust can be broken so readily and so many germinating weed seeds killed. When the soil is very fine and mellow and the crust is not too hard, good and rapid work can be done with a horse weeder, an implement with long teeth similar to those of a hay-rake, but much closer together. Only one mule is needed to draw the weeder, and it is a very satisfactory implement where the soil is in good condition for its use, though too light to break a heavy crust or to kill weeds when more than an inch in height. Where the ground is rough or has many hard clods the harrow is much better than the weeder. Cultivation should follow each rain to prevent the formation of a crust and to kill weeds as soon as they germinate, and the harrow or weeder is the best implement to use until the corn is at least 6 inches high. It is true that the later harrowings will leave the corn looking somewhat torn and ragged, but it will recover very quickly and no permanent injury will result.

The corn should be hoed and thinned to the proper number of stalks when it is from 4 to 6 inches high, as it will then be past danger from bud worms, cutworms, and other insects which often attack the young plants soon after they appear, but which seldom do any injury later in the season. At the same time any weeds which may be growing in the rows between the stalks should be cut out, and if this hoeing is carefully done the crop will need no other hand work. After the corn becomes too large for using the harrow, the best work can be done with a light side harrow or with a cultivator having from five to seven teeth and running not more than 2 inches deep. The old practice of "bleeding" corn by a very deep cultivation toward the end of the cultivating season is never beneficial and is usually quite injurious, and especially so if the bleeding is done at the beginning of a drought.

While it may sometimes be advantageous to "ridge up" corn by throwing soil toward the rows at the time of the last cultivation, if

this can be done only at the expense of cutting or uncovering the roots between the rows it should always be avoided. The principal advantage claimed for the ridging is that it assists the brace roots of the corn to take a better hold upon the soil and thus prevent the stalks from being blown down so easily by heavy storms. While this claim has some good foundation, still the excess of stalks blown down where they are not ridged will not repay the injury to the whole crop which is sure to result from a wholesale cutting of roots just at the time when they are most needed to develop the newly formed ears. It is a commonly accepted fact that "root pruning promotes seed production," but in this case the root pruning is done too late. The seeds have already been formed, and what the plant needs at this time is an uninterrupted supply of nourishment to enable them to develop to their fullest size. If root pruning is ever beneficial it is before the seed are formed, and when done later its only effect is to dwarf both plant and seed.

Several of the experiment stations have tested the relative advantages of the deep and shallow cultivation of corn very carefully, and the results of many such tests have already been reported. The records of 116 such tests made at 13 different stations show that 61 tests of deep cultivation gave an average yield of 64.9 bushels per acre, while 55 tests of shallow cultivation gave an average yield of 74.7 bushels per acre, a difference of more than 15 per cent in favor of shallow cultivation. In only 5 cases out of the entire number reported did the deep culture give the better results.

On large and fairly level fields some form of two-horse riding cultivator is often used, the disk cultivator being more popular than any other. With these implements it is not difficult to cultivate as much as 8 acres in a day, and such rapid work makes cultivation very inexpensive. By planting in checks, so that cultivation can be given in both directions, and by the use of the harrow for the earlier cultivation and a two-horse cultivator for the later work, the total expense for labor in preparing the land, planting, and cultivating, does not exceed $1.50 to $1.75 per acre. This plan is now being followed on many large plantations, but many who have tested the matter quite thoroughly have come to the conclusion that more thorough though more expensive cultivation is more profitable in the end.

Whatever system may be adopted the cultivation should be sufficiently frequent to keep down all weeds and to break the surface crust after every rain. In time of drought the cultivation should be as frequent as possible. Deep cultivation at such times is often ruinous, but when only 1 or 2 inches of the surface soil is stirred evaporation is checked, and although the surface may become very dry and dusty the soil immediately below this "dust mulch" will remain fresh and moist much longer than when the surface is allowed to become compact, even though not crusted by rains. At the usual prices for corn and for labor in the South 1 bushel of corn will pay for a single cultivation of 2 acres

of land. Much of the corn grown in this section is cultivated only three times, though it is the uniform experience that more frequent cultivations result in a greatly increased yield. An increase of only 2 bushels per acre is ample pay for the three additional cultivations, and it is rare that the additional labor does not give a good profit. Corn often suffers seriously from the want of cultivation, but never from too frequent, shallow stirring of the soil.

## HARVESTING AND STORING THE CROP.

The more common method of harvesting the crop is to "pull" the ears, with a good portion of the husks attached, leaving all the fodder in the field. After the crop has been gathered hogs and cattle are turned into the fields and so a portion of the fodder is utilized. This seems like a wasteful method, but in a region where the cornstalks are usually large and coarse and where hay can be made and saved with so little expense it is often the most economical and profitable plan. Whether to cut the stalks and save them for coarse feed or to give cattle the range of the field and use the labor in making other hay depends on the amounts of feed which can be secured by equal amounts of labor. When the entire stalk is saved the yield of dry forage per acre is from 1½ to 2 tons, and of that amount approximately one-fourth, and that the part which is the most palatable and has the greatest feeding value, may be saved by turning stock into the field. Taking into account the amount which will be gathered by cattle without expense and the various losses in handling and feeding the stalks the total additional amount of feed saved by cutting is rarely more than 1 ton per acre. To secure this additional ton the entire crop must be cut, and in order to make more than half the weight of fodder available for food all must be run through a shredder, thoroughly dried, and stored in a dry place. The palatability of the shredded fodder varies greatly. If the cutting is done early, while the upper leaves are still green and the stalk is not yet dry, the yield of fodder will be much heavier and of much better quality than when the cutting is done later, but the early cutting will cause a loss in the grain yield and the fodder will be more difficult to cure. As already remarked, the only object in saving the fodder is to secure a given amount of forage for feeding stock. On many plantations an equal amount of forage of better quality can be secured if the labor necessary for saving the corn fodder is used in making and saving hay, and the farmer who adopts either of the rotations suggested on a previous page will rarely find it profitable to cut, shred, and house his cornstalks.

The results of two years' work at the Alabama College Station[1] gives the stalks a value of $2.95 per acre over the amount received when only the ears were harvested, and whether that amount, less the value of

[1] Alabama College Sta. Bul. 88.

the standing stalks, is sufficient to cover the cost of cutting and handling the fodder is a question which each planter must decide for himself.

When the corn crop is to be followed by a September or October sowing of clover or any other crop for mowing it will pay to cut the stalks to get them out of the way, and when the labor of cutting is necessary for the success of the succeeding crop it will usually pay well to save the stalks for fodder, as the additional expense will be slight.

"Topping" corn, i. e., cutting off the stalk just above the ear after the grain begins to harden, gives a much better fodder than is obtained by harvesting the whole stalk, but the labor involved is considerable, the yield of fodder light, and the injury to the grain yield is usually greater than the value of the fodder secured. At the Mississippi Station[1] the removal of the tops during three seasons caused an average decrease of 20 per cent in the grain yield. This large decrease in grain was doubtless due partially to cutting the tops too early, but at other stations where similar tests have been made the average decrease in yield has been 16 per cent, and the value of the fodder secured has rarely equaled that of the grain lost.

Stripping the leaves from the stalks (a very common practice in all parts of the South) is also of doubtful economy, especially when the work is done by hired labor. More or less ears are sure to be broken off and lost. If the stripping is done early the yield of grain is decreased, and if done late the fodder secured is of but little value. It is often the case that laborers are glad to pull the fodder on shares, taking one half and giving the owner the other half. If the crop is well matured before the pulling is done this will be profitable to the owner, but the fodder will rarely pay for the labor when it must be pulled by hired labor.

If the securing of a certain amount of forage is the only object it will seldom be profitable for the Southern planter to hire labor to gather either the whole stalks, the tops, or even the leaves from his cornfields when he has land on which he can grow hay and stock to graze the cornfield after the crop has been gathered. If he has labor which would otherwise be idle, or if it is desirable to clear the ground for the immediate sowing of some other crop, the fodder is well worth saving, even though it makes forage of an inferior quality.

When corn is to be used during the winter for feeding fifteen or more milch cows it is economical to use a part of the crop in filling a silo. A silo of sufficient size to hold 25 tons, or feed for 20 cows 100 days, can be built for about $100, while one of larger size can be built for much less expense in proportion to its capacity. The average cost of growing the corn and filling the silo is about $1 per ton. The crop of stalks from an acre will require about the same amount of storage room, whether it is placed in a silo or is preserved as shredded fodder, though the building for the silo must be much more substantial than that

[1] Mississippi Sta. Bul. 33.

needed for sheltering the fodder. The silage will give much better satisfaction than fodder for feeding milch cows, but the fodder is considered preferable for horses or mules. The same power and the same machine which are used in shredding the stalks may be used in preparing the silage.

The common practice of gathering and storing corn with the husks still inclosing the ears is advocated by many from a belief that the husks serve to protect the grain from the attacks of insects which are often very destructive to stored grain. The two insects which are most destructive to stored corn are the Angoumois grain moth (*Gelechia cerealella*) and the black weevil (*Calandra oryzæ*), and as the corn is often infested by one or both of these insects while still in the field there is little to support the idea that the husks serve as a protection. Insects which find their way so quickly to the bottom of a bin filled with oats or through the meshes of a closely woven cloth bag will not be hindered from finding corn which is only partially inclosed by husks. The husks add materially to the bulk of the stored corn, they afford no protection from insects, and provide the best of nesting material for rats and mice. The corn must be husked before it can be shipped, and most of it before it can be used. Husking can be done more rapidly and with less expense as the corn is being gathered than at any other time, and under ordinary circumstances that is the best time for doing the work.

If corn is to be stored only a short time the ordinary open crib is all that is necessary, but if it is to be kept until spring before using the sides and bottom of the crib should be tight, so that the corn can be treated with bisulphid of carbon to kill moths and weevils. If thoroughly dry when brought from the field it may be stored in such a bin with no danger from heating or molding, and if treated at once by pouring bisulphid over the top of the corn, using one pound of the liquid for each 100 bushels of grain, it will be secure from insect depredations for several months. If the corn is kept until late in the season it should be watched during the spring, and if either moths or weevils should be found it should receive another treatment. If the corn is damp when gathered it will not be safe to put it in a close crib which is not well ventilated, while if placed in an open crib it can not be treated for killing insects. If no insects can be found in the corn when it is gathered immediate treatment is not necessary, as there will be but little danger of loss in the grain which is used during the winter. If already infested, however, it should be treated at once. Many who prefer to use an open crib for permanent storing place the corn first in what is known as a "quarantine bin," where it is treated and then removed to the cribs where it is to remain. The quarantine bin may be one which has been built for the purpose, but is more often a convenient corner of the barn which has been boarded up so as to make the sides close, and which is of sufficient size to hold 100 bushels or more. The corn is placed in this bin as it is gathered, and when it is

filled 1 pound of bisulphid for each 100 bushels of grain is poured over it and the top is covered with a tarpaulin or with old sacks to confine the fumes of the liquid. By the end of the third day all the insects will have been killed and the corn may be removed with perfect safety. If the cribs where the corn is to be stored have previously been infested with insects they should be treated with bisulphid before the new corn is gathered. The only special care necessary in using the bisulphid is to prevent an explosion from fire, as it is very easily ignited, and no lantern or light of any kind, or even a pipe, should be allowed in a building where it has been used so long as any of its odor can be detected, which will rarely be more than three days after its application. The bisulphid is not expensive, costing only 10 cents per pound when bought in 50 pound lots, and its use does not injure the corn for feeding, grinding, or for planting.

China berries, Jerusalem oak, salt, and other things are often recommended as preventives of insect attacks, but are of little if any value.

## SAVING SEED.

Corn is a plant which varies so quickly and can be modified so easily by planting seed from any desired form that constant care in the selection of seed is as important as intelligent cultivation. The period of growth may vary from 80 to 200 days, the height of the stalk from 6 to 16 feet, and the number of ears on a stalk from 1 to 8 or 10. Some stalks produce several branches or "suckers," while others remain strictly single, and in some the cob has fully three times the diameter it has in others. The size and shape of the grain shows equal differences, and color is almost the only permanent character found in any of the hundreds of varieties in cultivation. This variability is due, partially, to a natural tendency to variation and still more to the fact that each ear is usually fertilized by pollen from many different stalks and so may give crosses between the plant on which it was grown and a score or more of those which surrounded it. Although it is possible for a plant to vary widely from the one on which the seed was grown the probabilities are strong that it will have a close resemblance to its parent, and therefore seed should be selected from only those stalks which are nearest to the form and habit desired. For all ordinary purposes the value of a variety depends on the amount of shelled corn which it will produce per acre. This in turn depends fully as much on the growth and productiveness of the individual stalks as upon the size and shape of the separate ears, and for that reason seed should always be selected in the field rather than from the crib.

The best plan for saving seed is to go through the field before the crop is harvested and gather the best ears from the best stalks. The largest yields of grain are usually made from varieties producing two ears on each stalk, and if such a variety is desired then seed should be saved only from stalks bearing two ears. It is sometimes claimed

that the upper one of two ears will produce the earlier maturing crop, but in the South early maturity is of so little importance that if a stalk has two good ears both should be taken; if one ear is good and the other only fair the better one may be taken; while if either ear is very poor in size, shape, or fullness both should be rejected. If a variety bearing only one ear to each stalk is preferred the ears selected for seed should be the largest which can be found, of nearly equal diameter throughout, and well filled at each end. It is as important to take seed from the best stalks as from the best ears, and whatever variety may be preferred every ear which is selected for seed should be taken from a stalk which in size, habit of growth, and number of ears approaches closely to what is the desired form for that variety.

If careful hands are employed in gathering the crop a very good selection of seed may be made by having a box in the wagon into which the most desirable ears may be thrown as they are found.

In selecting seed from the crib, as is often done, nothing can be known of the character of the stalks upon which the ears were grown, and little or no improvement can be made in a variety by such a selection; while a careful and judicious selection in the field will work a constant and gradual improvement in the crop and will make it more nearly uniform with each succeeding year. No one item in the growing of corn is of greater importance than the selection of seed.

After the seed has been selected it should be thoroughly dried, treated with bisulphid of carbon to destroy insects, and then stored where it will be kept dry and secure from rats and mice.

It is a somewhat common practice to discard the tips and butts of the ears when shelling the seed for planting, but the practice is of doubtful benefit. A number of the experiment stations in both the North and the South have made repeated tests of the productiveness of seed from different parts of the ear, but these tests have shown no marked or constant differences in yield, even when the selections have been repeated through several generations.

## SUMMARY.

(1) The best soil for corn is a rich sandy loam which contains a good supply of humus. Land which has been used for growing red clover, melilotus, cowpeas, or other leguminous crops is much better than that which has been used recently for hoed crops.

(2) In using manures and fertilizers it is better to use the coarse stable manure and the whole cotton seed on the heavier soils, and the well-rotted manure and the cotton-seed meal on the lighter soils.

(3) All well-drained lands should be plowed flat, and high beds are advisable only on lands which are subject to overflows. When beds are used they should be wide enough for two rows each.

(4) The best variety of corn for ordinary purposes is the one which will produce the greatest amount of shelled grain per acre, regardless of the number or size of the ears.

(5) White varieties will usually make a heavier yield than colored varieties, though many colored varieties are more vigorous and hardy than are some of the more prolific white varieties.

(6) The best yields are secured from dent varieties, which require about 160 days for maturing and average nearly two ears per stalk. The ears should be of good size, have small cobs well filled at each end, and should hang downward when ripe.

(7) Nothing is gained by planting before the ground is sufficiently warm and dry to promote immediate growth. Early plantings should not be covered so deep as late plantings.

(8) Cultivation should be shallow and frequent, and the surface of the ground should be kept as nearly level and smooth as possible.

(9) When other hay can be saved readily and the cornfields can be pastured immediately after the crop is gathered it is not usually profitable to cut the stalks for fodder.

(10) Corn which is to be stored for some time should be treated with bisulphid of carbon to destroy insects.

(11) Seed should always be selected in the field by taking the best ears from the best stalks.

## FARMERS' BULLETINS.

These bulletins are sent free of charge to any address upon application to the Secretary of Agriculture, Washington, D. C. Only the following are available for distribution:

No. 16. Leguminous Plants for Green Manuring and for Feeding. No. 18. Forage Plants for the South. No. 19. Important Insecticides: Directions for their Preparation and Use. No. 21. Barnyard Manure. No. 22. Feeding Farm Animals. No. 23. Foods: Nutritive Value and Cost. No. 24. Hog Cholera and Swine Plague. No. 25. Peanuts: Culture and Uses. No. 26. Sweet Potatoes: Culture and Uses. No. 27. Flax for Seed and Fiber. No. 28. Weeds; and How to Kill Them. No. 29. Souring of Milk and Other Changes in Milk Products. No. 30. Grape Diseases on the Pacific Coast. No. 31. Alfalfa, or Lucern. No. 32. Silos and Silage. No. 33. Peach Growing for Market. No. 34. Meats: Composition and Cooking. No. 35. Potato Culture. No. 36. Cotton Seed and Its Products. No. 37. Kafir Corn: Characteristics, Culture, and Uses. No. 38. Spraying for Fruit Diseases. No. 39. Onion Culture. No. 40. Farm Drainage. No. 41. Fowls: Care and Feeding. No. 42. Facts About Milk. No. 43. Sewage Disposal on the Farm. No. 44. Commercial Fertilizers. No. 45. Some Insects Injurious to Stored Grain. No. 46. Irrigation in Humid Climates. No. 47. Insects Affecting the Cotton Plant. No. 48. The Manuring of Cotton. No. 49. Sheep Feeding. No. 50. Sorghum as a Forage Crop. No. 51. Standard Varieties of Chickens. No. 52. The Sugar Beet. No. 53. How to Grow Mushrooms. No. 54. Some Common Birds in Their Relation to Agriculture. No. 55. The Dairy Herd: Its Formation and Management. No. 56. Experiment Station Work—I. No. 57. Butter Making on the Farm. No. 58. The Soy Bean as a Forage Crop. No. 59. Bee Keeping. No. 60. Methods of Curing Tobacco. No. 61. Asparagus Culture. No. 62. Marketing Farm Produce. No. 63. Care of Milk on the Farm. No. 64. Ducks and Geese. No. 65. Experiment Station Work—II. No. 66. Meadows and Pastures. No. 67. Forestry for Farmers. No. 68. The Black Rot of the Cabbage. No. 69. Experiment Station Work—III. No. 70. The Principal Insect Enemies of the Grape. No. 71. Some Essentials of Beef Production. No. 72. Cattle Ranges of the Southwest. No. 73. Experiment Station Work—IV. No. 74. Milk as Food. No. 75. The Grain Smuts. No. 76. Tomato Growing. No. 77. The Liming of Soils. No. 78. Experiment Station Work—V. No. 79. Experiment Station Work—VI. No. 80. The Peach Twig-borer—an Important Enemy of Stone Fruits. No. 81. Corn Culture in the South. No. 82. The Culture of Tobacco. No. 83. Tobacco Soils. No. 84. Experiment Station Work—VII. No. 85. Fish as Food. No. 86. Thirty Poisonous Plants. No. 87. Experiment Station Work—VIII. No. 88. Alkali Lands. No. 89. Cowpeas. No. 90. The Manufacture of Sorghum Sirup. No. 91. Potato Diseases and Their Treatment. No. 92. Experiment Station Work—IX. No. 93. Sugar as Food. No. 94. The Vegetable Garden. No. 95. Good Roads for Farmers. No. 96. Raising Sheep for Mutton.